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Landsat-D Assessment System Library

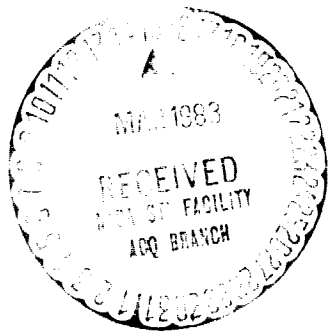
Computer Compatible Tape

(LASLIB-CCT/LAS-CCT)

Tape Format Document

WBS No. 10T031

June, 1982



(E83-10229) LANDSAT-D ASSESSMENT SYSTEM LIBRARY COMPUTER COMPATIBLE TAPE (LASLIB-CCT/LAS-CCT) (National Aeronautics and Space Administration) 54 p HC A04/MF A01

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DISCUSSION OF THE TAPE FORMAT

This document describes the format for computer compatible tapes (CCT) containing Thematic Mapper Archival Data (CCT-LASLIB-AT, abbreviated in this document as AT) and Product Data (CCT-LASLIB-PT, abbreviated in this document as PT) generated by the Landsat-D Assessment System (LAS). The generic name of this format, LAS CCT, is used interchangeably with LASLIB CCT. These data tapes are engineering products developed primarily for LAS internal use to assist in the early evaluation of Thematic Mapper data quality and ground data processing algorithms during the limited period of one year following the launch of Landsat-D. The data result from the application of engineering level software developed specifically to provide early access to Thematic Mapper results prior to the completion of the Landsat-D ground segment operational software. These tapes are provided to the EROS Data Center through the Landsat-D Project Science Office for subsequent distribution as defined under the Freedom of Information Act. Requests for specific data tapes should be directed to the EROS Data Center.

In these LAS-CCT tape volumes, LAS data files have been packaged within superstructure files and superstructure records in the manner recommended by the Landsat Ground Station Operators Working Group (LGSOWG) (Ref. 1).

The computer compatible tapes contain image data in band sequential format (BSQ) which means that a separate file is used for each sensor band. Each image file is preceded by a label file containing standard LAS descriptive label information. The number and sequence of files are identical for both AT and PT data. However, the larger size of PT images requires the use of three tapes while AT files are written on two tapes.

The allocation of the data files on the tape reels is illustrated in Figures 1 and 2. To insure proper LGSOWG form, each reel begins with a volume directory file. The last file of the last reel is a special directory containing parameter values indicating that no additional files follow. A

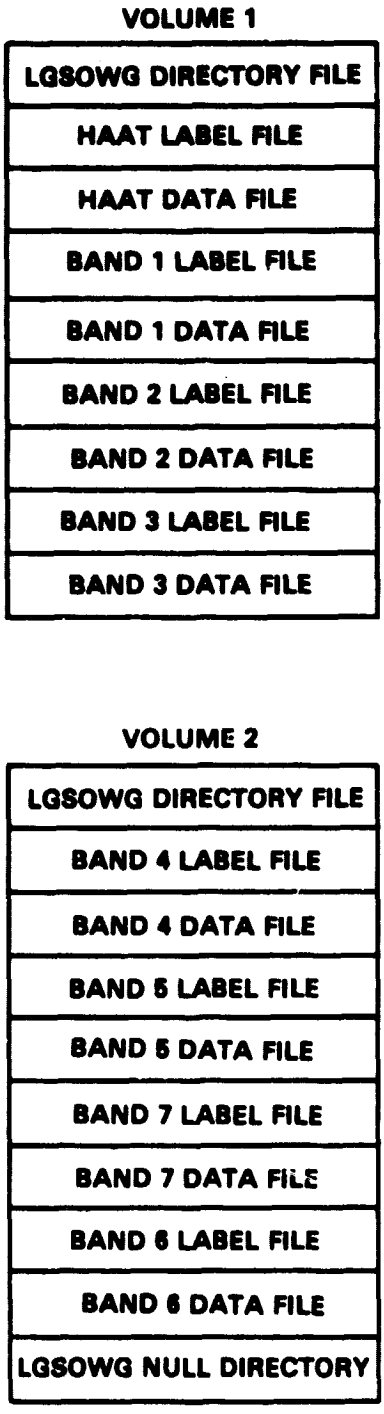

Figure 1. Tape Allocation for CCT-AT

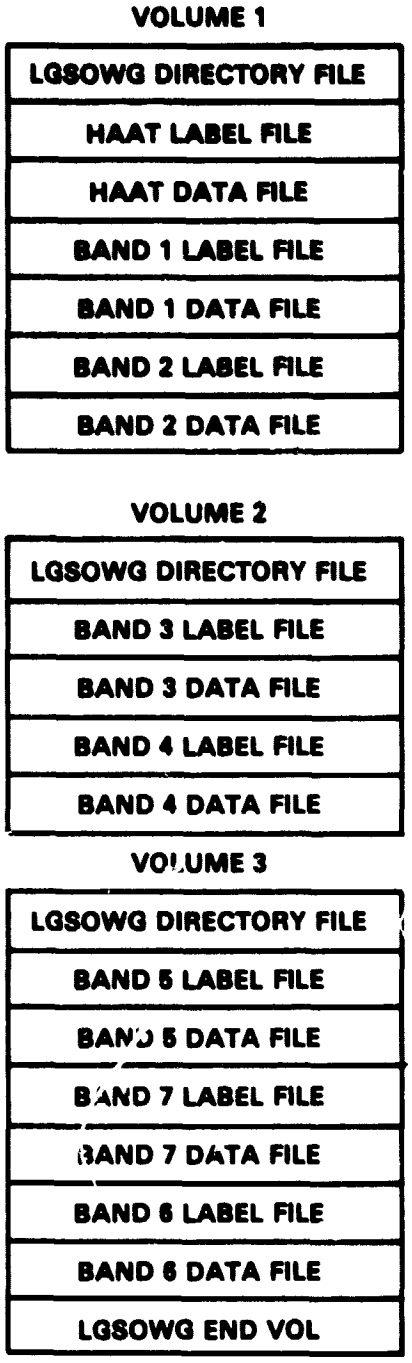

Figure 2. Tape Allocation for CCT-PT

single Header, Ancillary, Annotation, and Header (HAAT) file precedes the image files. Each data file is preceded by a copy of the label file that is maintained internally by LAS. Several of the important parameters of the label are redundant with parameters in the LGSOWG superstructure records. In such cases, the parameters are copied so that the data may be processed by LGSOWG or LAS software. The image files have been arranged on the tapes in Band Sequential Order.

The A-level images are rectangular and contain 5792 image lines of 6176 1-byte pixels. Each line is extended with 480 unused bytes to a total length of 6656 bytes. This extension improves internal hardware efficiency on the LAS VAX computer. The values of the unused bytes are undefined.

The P-level images have been projected onto a coordinate frame that is fixed on the Earth's surface. As a result, rotation of the Earth beneath the spacecraft skews the acquired image into a parallelogram in ground coordinates. The standard LAS production software introduces variable amounts of left and right fill on each image line so that the standard P-level image is stored as a rectangular array. This fill scheme is illustrated in Figure 3. Each measured line is extended to a standard length of 6967 1-byte pixels using zero fill. In addition, the line is stored in a record whose length is a multiple of 512, in this case 7168 bytes. The values of the unused bytes are not defined. The P-level image contains 5965 lines.

All of the data values contained in the tapes are written in a form suitable to a VAX computer with one exception - the first field of each LGSOWG superstructure record is written in the byte order required by LGSOWG. Where arrays are used, the order in which array elements are stored is FORTRAN-like; that is, the first array index varies most rapidly.

The tapes produced by LAS are 2400-foot reels of magnetic tape recorded at a density of 6250 bpi using 9-track GCR technique. The magnetic tape is unlabelled. The tape reels themselves have printed identification for the volume and the Landsat-D Scene ID. The production program for LAS-CCT writes physical tape records that contain 4 image lines. This blocking factor of 4 reduces space lost to gaps between tape records.

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OF POOR QUALITY

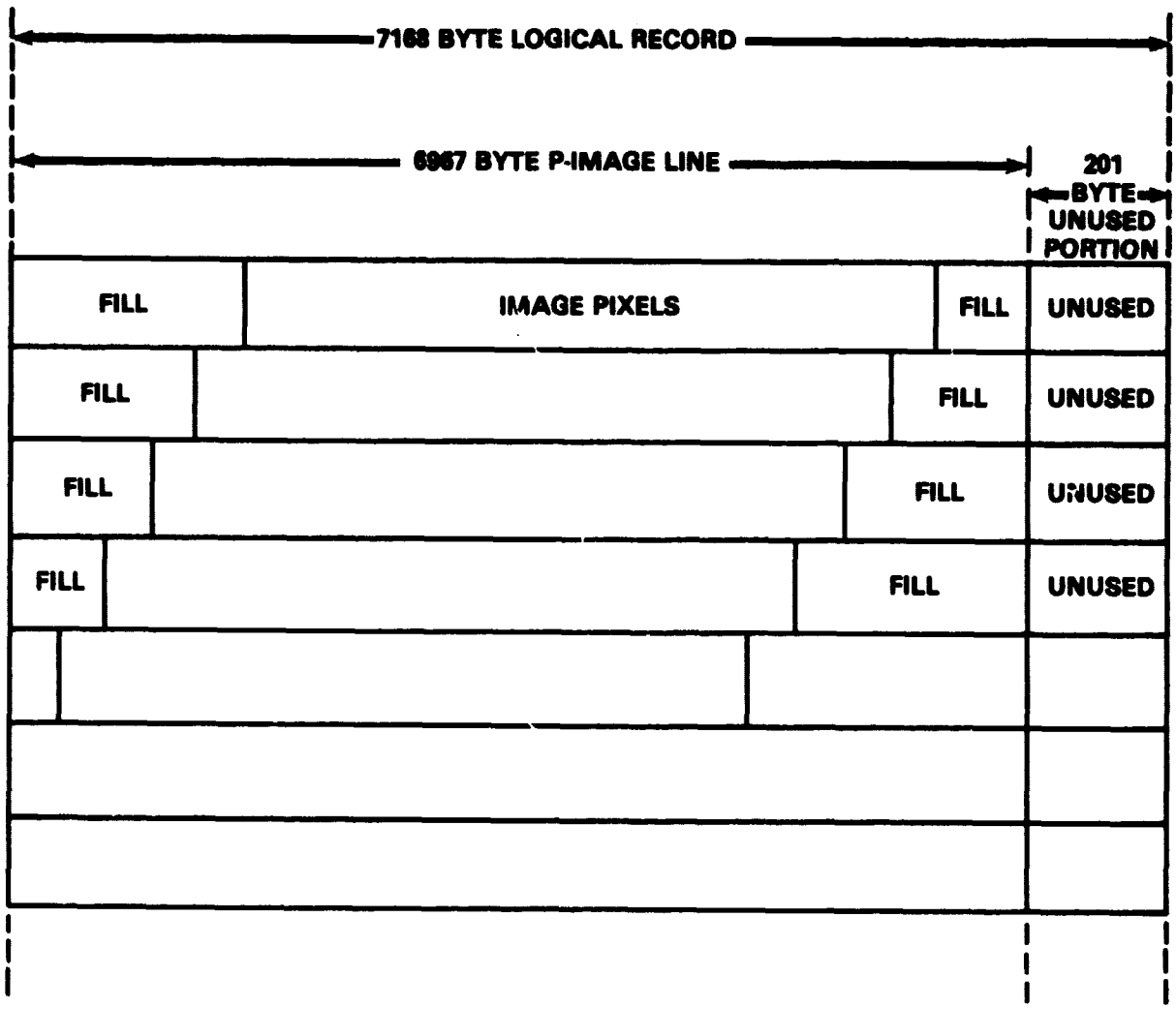

Figure 3. Line Fill Scheme for P-Data

This document describes the format in comprehensive detail through the use of a hierarchical arrangement of tables. The top level tables provide an overview of the structure, yet particular aspects of the tape data may be followed to any level of detail from volume organization down to the individual byte fields. The levels of organization required by the tape format are the following:

Volume Group: The set of tapes necessary to contain the information for a full TM Scene. This group is a Logical Volume as defined by LGSOWG; however, LGSOWG allows more complex file arrangements than those used for LAS-CCT. In LAS, there is only one scene per volume group.

Logical Volume: a term defined by LGSOWG (Ref. 1) to mean a related group of files occupying one or more physical tape volumes.

Physical Volume: A reel of magnetic tape. Each reel begins with a LGSOWG volume descriptor file. The descriptors on each reel are basically identical except for a field which notes where this physical volume is situated in the file sequence of the logical volume.

File: A block of related information bounded by tape marks (end of file marks). LGSOWG requires each file to be prefaced with a file descriptor record.

Record: A sequence of bytes recorded on tape and bounded by interrecord gaps. An LAS-CCT file consists of a sequence of records.

Field: A sequence of bytes that form part of a record. Both alphanumeric (ASCII) and binary numerical fields are used in LAS-CCT format. ASCII files are left justified.

The LAS-CCT format does not utilize the variability allowed by the LGSOWG standard. The records within a file are all the same length. Furthermore, the LAS-CCT does not use the variable segment option of the

LGSOWG file descriptors. In practice, this means that the scene identification must be read from the fixed location on tape as defined in this document, or it may be found on the printed document for the tape.

Evaluation of the early results from Landsat-D may motivate further additions or modifications to this document. In this case, revised pages for the document will be distributed with a cover letter giving the date on which the change becomes effective for the data product and listing the dates of all previous changes.

REFERENCES:

1) LGSOWG CCT Format CCB Document, CCB-CCT-0002-C, August 28, 1979.

2) Landsat-D Data Format Control Book Vol. VI, Appendix A, General Electric Corporation, GES 10033, July 31, 1981.

Table 1

LAS-CCT VOLUME GROUP CONTENTS

Source of Information: This document defines the contents of the Volume Group (LGSOWG Logical Volume).

Tape Volume	Table Ref.	Description
		-------- Description for "AT" Data --------
1	2	Contains LGSWOG volume directory, HAAT, and bands 1 to 3, and associated LAS labels.
2	3	Contains LGSWOG volume directory, and Bands 4 to 7, and associated LAS labels. The last file is a LGSOWG null volume directory.
		-------- Description for "PT" Data --------
1	4	Contains LGSWOG volume directory, HAAT, and bands 1 and 2, and associated LAS labels.
2	5	Contains LGSWOG volume directory, and Bands 3 and 4, and associated LAS labels.
3	6	Contains LGSWOG volume directory, and Bands 5, 7, and 6, and associated LAS labels. The last file is a LGSOWG null volume directory.

Table 2

FIRST VOLUME CONTENTS FOR "AT" DATA

Source of Information: The contents are defined here based on the packaging requirements of Ref. 1 and the file size.

File	Table Ref.	Cumulative Size (ft.)	Description
1	7	0.5	LGSOWG Volume directory
2	8	1.0	LAS Label File for HAAT
3	10	4.7	HAAT File
4	8	5.1	LAS Label File for Band 1
5	9	556	LAS Image File for Band 1
6	8	556	LAS Label File for Band 2
7	9	1107	LAS Image File for Band 2
8	8	1107	LAS Label File for Band 3
9	9	1658	LAS Image File for Band 3

Table 3

SECOND VOLUME CONTENTS FOR "AT" DATA

Source of Information: The contents are defined here based on the packaging requirements of Ref. 1 and the file size.

File	Table Ref.	Cumulative Size (ft.)	Description
1	7	0.5	LGSOWG Volume Directory
2	8	1.0	LAS Label File for Band 4
3	9	552	LAS Image File for Band 4
4	8	552	LAS Label File for Band 5
5	9	1103	LAS Image File for Band 5
6	8	1103	LAS Label File for Band 7
7	9	1654	LAS Image File for Band 7
8	8	1654	LAS Label File for Band 6
9	9	2205	LAS Image File for Band 6
10	14	2205	Null Volume Directory to mark end of LGSOWG Logical Volume

Table 4

FIRST VOLUME CONTENT FOR "PT" DATA

Source of Information: The contents are defined here based on the packaging requirements of Ref. 1 and the file size.

File	Table Ref.	Cumulative Size (ft.)	Description
1	7	0.5	LGSOWG Volume Directory
2	8	1.0	LAS Label File for HAAT
3	10	4.7	HAAT File
4	8	5.1	LAS Label File for Band 1
5	9	613	LAS Image File for Band 1
6	8	613	LAS Label File for Band 2
7	9	1220	LAS Image File for Band 2

Table 5

SECOND VOLUME CONTENT FOR "PT" DATA

Source of Information: The contents are defined here based on the packaging requirements of Ref. 1 and the file size.

File	Table Ref.	Cumulative Size (ft.)	Description
1	7	0.5	LGSOWG Volume Directory
2	8	1.0	LAS Label File for Band 3
3	9	608	LAS Image File for Band 3
4	8	609	LAS Label File for Band 4
5	9	1216	LAS Image File for Band 4

Table 6

THIRD VOLUME CONTENT FOR "PT" DATA

Source of Information: The contents are defined here based on the packaging requirements of Ref. 1 and the file size.

File	Table Ref.	Cumulative Size (ft.)	Description
1	7	0.5	LGSOWG Volume Directory
2	8	1.0	LAS Label File for Band 5
3	9	608	LAS Image File for Band 5
4	8	609	LAS Label File for Band 7
5	9	1216	LAS Image File for Band 7
6	8	1216	LAS Label File for Band 6
7	9	1824	LAS Image File for Band 6
8	7	1824	Null Volume Directory to mark end of LGSOWG Logical Volume

Table 7

LGSOWG VOLUME DIRECTORY CONTENTS

Source of Information: This is the required LGSOWG prologue for LAS standard disk data.

Record	Table Ref.	Description
1	11	Volume Descriptor Record
2	12a	File pointer to file 2, HAAT Label
3	12b	File pointer to file 3, HAAT data
4	12c	File pointer to file 4, Band 1 label
5	12d	File pointer to file 5, Band 1 data
6	12c	File pointer to file 6, Band 2 label
7	12d	File pointer to file 7, Band 2 data
8	12c	File pointer to file 8, Band 3 label
9	12d	File pointer to file 9, Band 3 data
10	12c	File pointer to file 10, Band 4 label
11	12d	File pointer to file 11, Band 4 data
12	12c	File pointer to file 12, Band 5 label
13	12d	File pointer to file 13, Band 5 data
14	12c	File pointer to file 16, Band 7 label
15	12d	File pointer to file 17, Band 7 data
16	12c	File pointer to file 14, Band 6 label
17	12d	File pointer to file 15, Band 6 data

Record size is 360 bytes.

Notes: A null volume directory contains only the first record and bytes 61 to 164 are set to blanks.

Table 8

CONTENTS OF LAS LABEL FILE

Source of Information: LAS standard disk data repackaged according to Ref. 1 (LGSOWG).

Record	Table Ref.	Description
1	13a	LGSOWG File Descriptor Record
2	14	LAS DDR record
3-n	15	Optional LAS history records

Record size is 512 bytes.

Table 9

CONTENTS OF THE LAS IMAGE DATA FILES

Record	Table Ref.	Description
1	13b	LGSOWG File Description Record
2...	-	Image line blocks. Physical tape records containing
...(NR+1)		an integral number of image lines.
		The number of records is stored in Table 2 Record 1 and
		Record 1 of this file.

Record Size: There are 4 lines per record. Each line is filled to an even multiple of 512. For A-data, the lines are 6176 pixels filled to 6656 bytes. For P-data, the lines are 6967 pixels filled to 7168 bytes. Note that there are fewer than 6967 measured pixels on a P-image line because left and right zero fill is used to rectangularize the image.

Number of Records: NR= 1+ (NL=1)/4 ;

Where NL = number of image lines.

For AT data, NL is 5792. For PT data, it is 5965.

Thus for AT data, there are 1448 records of 26624 bytes each; while for PT data, there are 1492 records of 28672 bytes each.

Table 10

CONTENTS OF HAAT DATA FILE

Source of Information: LAS standard HAAT data repackaged according to Ref. 1. The LAS format is identical to Ref. 2 except that the records have been filled to an even number of VAX pages.

Note: The reference documentation uses the term "major frame". A major frame is equivalent to one record in the LAS-CCT HAAT format.

Record	Table Ref.	Description
1	13c	LGSOWG File Description Record
2	16	Interval Header Record 1
3	17	Interval Header Record 2
4	18	Interval Header Record 3
5	19	Interval Header Record 4
6	20	Interval Header Record 5
7	21	Interval Header Record 6
8	22	Scene Header Record 1
9	23	Scene Header Record 2
10	24	Ancillary Data Record 1
11	25	Ancillary Data Record 2
12	26	Ancillary Data Record 3
13-31	27	Ancillary Data Records 4 to 21
32	28	Annotation Record 1
33	29	Annotation Record 2
34	30	Trailer Record

Record Size: 6400 bytes of data followed by 256 bytes of padding to fill a 6656 byte tape/disk record.

Table 11

CONTENTS OF LGSOWG VOLUME DESCRIPTOR RECORD

Source of Information: Follows Ref. 1 exactly with variable parameters set for this application.

Bytes	Format	Description
1-4	RI	Contains the value 1 to indicate first record.
5	B	Contains a record code of octal 300
6	B	Contains a type code of octal 300
7	B	Contains a subtype code of 077 octal
8	B	Contains a subsubtype code of 022 octal
9-12	RI	Contains length of this record, 360 decimal.
13-16	A4	Contains 'A ' indicating ASCII character set.
17-28	A12	Contains the document reference 'CCB-CCT-0002'
29-30	A2	Contains the document version ' C'
31-32	A2	Contains revision letter of superstructure records. the value ' ' is coded.
33-44	A12	Version of the LAS software. Initially, 'LAS V 1.0 ' is coded
45-60	A16	Identification of the physical reel of tape on which record is found.
61-76	A16*	Identification of the LGSOWG logical volume. For this application, the scrounge Scene-ID is coded.
77-92	A16	Identification of group as written on the tapes. Field 61-76 is repeated.
93-94	I2	Number of reels per group. For AT data, there are 2 reels and 3 for PT data.
95-96	I2	Sequence number of first volume. Always 1 for LAS.
97-98	I2	Sequence number of last volume. Duplicates field 93-94.
99-100	I2	Sequence number of the volume containing this record.
101-104	I4	Sequence number of the first file on this volume as counted over the volume group, omitting volume directories.
105-108	I4	Logical volume number. Always 1 for Scrounge.
109-112	I4	Number of this logical volume. Always 1 for Scrounge.
113-120	A8*	Creation date of volume set as YYYYMMDD.
121-128	A8*	Creation time as HHMMSSXX where XX= hundredths of seconds.
129-140	A12*	Country of origin: 'USA'
141-148	A8*	Agency of origin: 'NASAGSFC'
149-160	A12*	Originating Computer Center: 'LAS'

Table 11 (continued)

Bytes	Format	Description
161-164	I4*	Number of file pointers in the volume directory.
165-168	I4*	Number of records in the volume directory. The value is one greater than field 161-164 in LAS.
169-260		unused, reserved for LGSOWG expansion.
261-360		unused, available for local use.

* The indicated fields are not used for a null (last) volume descriptor.

Formats:

RI - A four byte integer correct for IBM systems. The integer is byte reversed on a VAX or PDP computer.

An - n ASCII characters.

In - n ASCII numeric characters representing an integer value.

B - a one byte integer regarded as unsigned.

Table 12

CONTENTS OF THE LGSOWG FILE POINTER RECORD

Source of Information: Reference 1.

Individual Cases:

A: Pointer to HAAT label file
B: Pointer to HAAT data file
C: Pointer to Image label file
D: Pointer to Image data file

Byte	Format	Description
1-4	RI	Contains the record number of this record within the Volume directory. The first file pointer is two, the next is three, etc.
5	B	Record code 333 octal
6	B	Record code 300 octal
7	B	Subtype code 022 octal
8	B	Subsubtype code 022 octal
9-12	RI	Length of this record, 360 decimal.
13-16	A4	Contains 'A ' to indicate ASCII code.
17-20	I4	Sequence number of the file referenced by this pointer. Files are counted over the volume group omitting the volume directories from the count.
21-36	A16	File identification. For a label file, the value is 'DDR '. For a data file, the file identification is copied from he corresponding label field (see FTYPE in Table 14).
37-64	A28	A description of the file. The string is: A,B,or C: 'ASCII AND BINARY DATA' D: 'CELLULAR DATA /OR IMAGE DATA'
65-68	I4	An abbreviation for preceding field. It is: A,B,or C: 'ABD ' D: 'COID'
69-96	A28	Contains the phrase "MIXED BINARY AND ASCII".
97-100	A4	Contains the code "MBAA" which abbreviates 69-96
101-108	I8	Number of records in the referenced file. Namely, A: blank, number of records variable. B: '32' C: blank, number of records variable. D: For AT, '1448'. For PT, '1492'
109-116	I8	The length in bytes of the file description records. In LAS, a uniform record length within a file is used. The length is: A: 512 bytes B: 6656 bytes C: 512 bytes D: 26624 for AT and 28672 for PT data.
117-124	I8	Largest record in the file, not counting descriptor. Same value as field 109-116

Table 12 (continued)

Bytes	Format	Description
125-136	A12	Contains the phrase "FIXED LENGTH"
137-140	A4	Contains an abbreviation for 125-136. In the absence of a LGSOWG standard, LAS codes "FB "
141-142	I2	Number of the physical volume on which the file starts.
143-144	I2	Number of the physical volume on which the file ends. N.B. LAS files begin and end on the same volume.
145-152	I8	First record number of the file portion on this volume. Always has the value 1 for LAS.
153-260		unused, reserved for LGSOWG expansion
261-360		unused, reserved for local use

Formats:

RI- A four byte integer correct for IBM systems. The integer is byte reversed on a VAX or PDP computer.

An - n ASCII characters.

In - n ASCII numeric characters representing an integer value.

B - a one byte integer regarded as unsigned.

Table 13

CONTENTS OF LGSOWG FILE DESCRIPTOR RECORD

Source of Information: Reference 1.

Individual Cases:
A: LAS Label
B: LAS Image Data File
C: HAAT Data File

Byte	Format	Description
1-4	RI	Contains the value 1 to indicate first record.
5	B	contains a record code of octal 077
6	B	contains a type code of octal 300
7	B	contains a subtype code of 022 octal
8	B	contains a subsubtype code of 022 octal
9-12	RI	contains length of this and all subsequent records. See field 109-116 of Table 12.
13-16	A4	contains 'A ' indicating ASCII character set.
17-28	A12	contains the document reference 'CCB-CCT-0002'
29-30	A2	contains the document version ' C'
31-32	A2	contain revision letter of superstructure records. the value ' ' is coded.
33-44	A12	Version of the LAS software. Initially, 'LAS V 1.0 ' is coded
45-48	I4	Number of this file in the logical volume. Counted from the first volume without counting volume directories.
49-64	A16	File identification. Agrees with bytes 21-36 of the file pointer (Table 12).
65-68	A4	Contains the string 'NSEQ'
69-76	I8	unused, set to zero.
77-80	I8	unused, set to zero.
84	A4	Type code locator. Values are: Case A: "FTYP" Cases B and C: "NTYP"
85-92	I8	contains the value 33 decimal
93-96	I4	contains the value 8 decimal.
97-100	A4	contains the string "NLGT"
101-108	I8	unused, blank
109-112	I4	unused, blank
113	A1	contains the character "N"
114	A1	contains the character "N"
115	A1	contains the character "N"
116	A1	contains the character "N"
117-180		unused, reserved for LGSOWG
181-		unused, reserved for variable segment. For LAS, no variable segments are used; however, the record is padded to the length of the remaining records of the file.

Table 13 (continued)

Formats:

RI - A four byte integer correct for IBM systems. The integer is byte reversed on a VAX or PDP computer.

An - n ASCII characters.

In - n ASCII numeric characters representing an integer value.

B - a one byte integer regarded as unsigned.

TABLE 14

CONTENTS OF DDR RECORD

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
1-20	A20	LABKEY	LOCATES DDR IN DISK FILE
21-24	---	----	RESERVED
25-28	A4	SEQNO	THIS NUMBER WRITTEN AS AN ASCII STRING SEQUENCES THE LABEL RECORDS BELONGING TO THIS IMAGE OR LABEL KEY.
29-32	I4	LASTNO	THIS INTEGER RECORDS THE LAST SEQNO USED IN EXTENDING THE SEQUENCE OF LABEL RECORDS
33-40	A8	LTYPE	THIS FIELD SPECIFIES 'DDR '
41-140	A100	TAE	THE FULL TAE NAME OF THE DATA FILE
141-148	A8	SOURCE	AN ASCII STRING WHICH GIVES THE SATELLITE AND INSTRUMENT THAT YIELDED THE ORIGINAL DATA. THE VALUES OF THIS FIELD ARE CONFIGURATION MANAGEMENT ITEMS AND THE LAST TWO CHARACTERS MUST AGREE WITH THE SATELLITE AND INSTRUMENT ATTRIBUTES IN THE TAE CATALOG. FOR LANDSAT-D TM AND MSS INSTRUMENTS THE VALUES ARE: 'LNDST-DT' AND 'LNDST-DM'
149-168	A20	FILE--CREATION--TIME	THIS FIELD RECORDS THE DATE AND TIME WHEN THIS DDR AND, BY ASSUMPTION, THE IMAGE WERE CREATED.
169-176	A8	FTYPE	THIS FIELD NAMES THE TYPE OF THE CORRESPONDING FILE. E.G. 'IMAGE'. THIS FIELD IS A CONFIGURATION MANAGEMENT ITEM BECAUSE FUTURE TAE VERSION MAY VERIFY THIS FIELD AGAINST THE PROCESS PDF.
177-178	---	----	RESERVED
179-180	L2	PVALID	A TRUE VALUE INDICATES THAT THE PIXEL "LOWVAL" AND "HIVAL" HAVE BEEN SET TO REASONABLE VALUES.

Table 14 (continued)

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
181-190	---	----	RESERVED
191-192	I2	BAND	BAND NUMBER OF IMAGE
193-194	I2	ICOORD	INDICATES THE STATUS OF IMAGE LOCATION VARIABLES; PFIRST, PDELTA, LFIRST, AND LDELTA. A VALUE 0 IMPLIES VARIABLES NOT SET; A VALUE 1 IMPLIES THE VARIABLES LOCATE THIS IMAGE IN THE ORIGINAL SCENE.
195-196	A2	DCODE	A TWO CHARACTER CODE FOR THE PIXEL DATA TYPE. THE TYPES ARE: IN: SIGNED INTEGER BI: UNSIGNED INTEGER FL: FLOATING POINT CM: COMPLEX THESE TYPES ARE STRICT CONFIGURATION MANAGEMENT ITEMS, IN ADDITION, ONLY A RESTRICTIVE NUMBER OF COMBINATIONS ARE ALLOWED IN CONJUNCTION WITH THE VARIABLES BCOUNT. THE ALLOWED COMBINATIONS ARE: IN: BCOUNT = 2,4 BI: BCOUNT = 1 FL: BCOUNT = 4 CM: BCOUNT = 8
217-236	A20	SCENE	IDENTIFICATION OF SCENE
237-280	---	----	RESERVED
281-284	I4	BCOUNT	NUMBER OF BYTES PER PIXEL VALUE SEE RESTRICTIONS ON DCODE.
285-288	R4	PFIRST	THE LOCATION OF THE FIRST PIXEL OF EACH LINE OF THIS IMAGE IN THE PIXEL COORDINATES OF THE ORIGINAL IMAGE. THE REAL VARIABLE ACCOMMODATES FRACTIONAL IMAGE SHIFTS.

Table 14 (continued)

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
289-292	R4	PDELTA	THE SPACING BETWEEN THE PIXELS OF THIS IMAGE RELATIVE TO THE PIXEL SPACING IN THE ORIGINAL IMAGE. THE REAL VARIABLE TYPE ALLOWS FRACTIONAL SPACINGS RESULTING FROM ZOOM EFFECTS.
293-296	I4	NP	NUMBER OF PIXELS PER LINE
297-304	---	----	RESERVED
305-308	R4	LFIRST	THE LOCATION OF THE FIRST LINE OF THIS IMAGE IN THE PIXEL COORDINATES OF THE ORIGINAL IMAGE. THE REAL VARIABLE ACCOMMODATES FRACTIONAL IMAGE SHIFTS.
309-312	R4	LDELTA	THE SPACING BETWEEN THE LINES OF THIS IMAGE RELATIVE TO THE LINE SPACING IN THE ORIGINAL IMAGE. THE REAL VARIABLE TYPE ALLOWS FRACTIONAL SPACINGS RESULTING FROM ZOOM EFFECTS.
313-316	I4	NL	NUMBER OF PIXELS
317-424	---	----	RESERVED
425-512	---	----	UNUSED

FORMATS:

AN ASCII STRING OF N CHARACTERS, LEFT JUSTIFIED WITH BLANK FILL.

L2 VAX 2 BYTE LOGICAL VARIABLE

I2 VAX INTEGER WORD

I4 VAX INTEGER LONG WORD

R4 VAX FLOATING POINT LONG WORD

Table 15

CONTENTS OF HISTORY RECORDS IN LABEL FILES

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
1-20	A20	LABKEY	LOCATES LABEL IN DISK FILE
21-24	---	----	RESERVED
25-28	A4	SEQNO	THIS NUMBER WRITTEN AS AN ASCII STRING SEQUENCES THE LABEL RECORDS BELONGING TO THIS IMAGE OR LABEL KEY.
29-32	I4	RECLEN	THIS INTEGER GIVES THE LENGTH OF THE VARIABLE SIZED HISTORY TEXT.
33-40	A8	LTYPE	THIS FIELD SPECIFIES 'DDR '
40-512	A		A TEXT STRING THAT BEGINS WITH THE DATE, TIME, AND LAS SOFTWARE MODULE NAME AND CONTINUES WITH A PARTICULAR MESSAGE CONCERNING THE DATA SET PROCESSING HISTORY. THE HISTORY TEXT MAY SPAN LABEL RECORDS AS INDICATED BY THE RECLEN PARAMETER.

FORMATS:

AN ASCII STRING OF N CHARACTERS, LEFT JUSTIFIED WITH BLANK FILL.

I4 VAX INTEGER LONG WORD

Table 16

HAAT FILE INTERVAL HEADER RECORD 1

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
1-4	L1	ZFILL1	FILL AT START OF RECORD
5-6	L1	MISNUM	MISSION NUMBER
7-8	L1	INTSEQ	INTERVAL SEQ. NUMBER
9-10	L1	SCNINT	NO. SCENES IN INTERVAL
11-20	L1	DUM1	
21-36	L1	IMSTART	START S/C TIME (YYDDDHHMMSSTTTFF)
37-52	L1	IMSTOP	STOP/S/C TIME (YYDDDHHMMSSTTTFF)
53-68	L1	PCDSTART	START PCD TIME (YYDDDHHMMSSTTTFF)
69-84	L1	PCDSTOP	STOP PCD TIME (YYDDDHHMMSSTTTFF)
85-88	I4	ORBIT	ORBIT NUMBER
89	L1	ORBDIR	ORBITAL DIRECTION
90-100	L1	DUM2	
101-104	I4	TMHSK	NO. OF TM HOUSEKEEPING RECORDS
105-116	L1	DUM3	
117-118	L1	EPHSCR	EPHEMERIS SOURCE
119-142	R4	INEPH	INITIAL EPHEM. POINTS
143-146	I4	RAWEPH	NO. OF RAW EPHEMERIS PTS.
147-150	I4	REJREPH	NO. OF REJ. RAW EPHEMERIS PTS.
151-162	R4	EPHACC	ACCURACY OF EPHEM. FIT
163-166	I4	NPREPH	NO. OF PROCESSED EPH. DATA REC.
167-180	L1	DUM4	
181-420	R4	ATTSUM	ATTITUDE SUMMARY DATA ((20,3) ARRAY; REF.2)
421-6400	L1	DUM5	

Table 17

HAAT FILE INTERVAL HEADER RECORD 2

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
1-4	L1	ZFILL2	FILL
5-6276	L1	TMHSK1	TM HOUSEKPG. REC. ((224,28) ARRAY: REF.2)
6277-6400	L1	DUM6	

Table 18

HAAT FILE INTERVAL HEADER RECORD 3

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
1-4	L1	ZFILL3	FILL
5-6276	L1	TMHSK2	TM HOUSEKPG. REC. ((224,28) ARRAY; REF.2)
6277-6400	L1	DUM7	

Table 19

HAAT FILE INTERVAL HEADER RECORD 4

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
1-4	L1	ZFILL	FILL
5-6339		PROCEPH1	PROCESSING EPHEMERIS DATA; 176 GROUPS OF A 9 VALUES
5-8	14		RECORD NUMBER
9-16	R8		Ref. 2
17-20	R4		X (FOR FIRST POINT)
21-24	R4		Y (FOR FIRST POINT)
25-28	R4		Z (FOR FIRST POINT)
29-32	R4		DX/DT (FOR FIRST POINT)
33-36	R4		DY/DT (FOR FIRST POINT)
37-40	R4		DZ/DT (FOR FIRST POINT)
.	.		.
.	.		.
.	.		.
6336-6339	R4		DZ/DT (FOR 176TH POINT)
.	.		.
.	.		.
.	.		.
6340-6400	L1	DUM8	

Table 20

HAAT FILE INTERVAL HEADER RECORD 5

CONTAINS PROCESSING EPHEMERIS DATA FOR THE NEXT 176 POINTS (POINTS 176-352). THE FORMAT IS THE SAME AS TABLE 19.

Table 21

HAAT FILE INTERVAL HEADER RECORD 6

CONTAINS PROCESSING EPHEMERIS DATA FOR THE NEXT 96 POINTS (POINTS 353-448). THE FORMAT IS THE SAME AS TABLE 19

Table 22

HAAT FILE SCENE HEADER RECORD 1

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
1-4	L1	ZFILL1	FILL.
5-16	L1	ID	IMAGE ID.
17-24	L1	WRSDES	WRS DESCRIPTOR.
25-29	L1	GENDATE	TAPE GENERATION DATE.
30-36	L1	DUM1	
37-38	L1	SENSID	SENSOR ID.
39-44	L1	DUM2	
45-48	I4	ORBIT	ORBIT NUMBER.
49-148	L1	DETSTAT	DETECTOR STATUS FLAGS.
149-150	L1	ACTDET	ACTIVE DETECTOR COUNT.
151-154	I4	PXSCAN	NUM. NUMBER OF PIXELS PER SCAN LINE.
155-164	L1	DUM3	
165-170	L1	SCSTID	SCENE START DLID.
171-176	L1	SCCNID	SCENE CENTER SLID.
177-182	L1	SCENID	SCENE END DLID.
183-198	L1	SCSTTIM	SCENE START TIME (YYDDDHHMMSSTTTFF).
199-214	L1	SCCNTIM	SCENE CENTER TIME (YYDDDHHMMSSTTTFF).
215-218	I4	WRSLIN	WRS CENTER SCAN LINE NUMBER.
219-222	I4	WRSPIX	WRS CENTER PIXEL NUMBER.
223-228	L1	DUM4	
229-232	I4	BMF	NO. OF BITS PER MINOR FRAME.
233-236	I4	MIMAJ	NO. OF MINOR FRAMES PER MAJOR FRAME.
237-240	I4	REPL	NO. OF REPLICATIONS.
241-260	L1	DUM5	

Table 22 (continued)

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
261-264	I4	ANNMIN	NO. OF MINOR FRAMES, ANNOTATION DATA.
265-268	I4	ANNMAJ	NO. OF MAJOR FRAMES, ANNOTATION DATA.
269-272	I4	ANCMIN	NO. OF BYTES OF ANNOTATION DATA.
273-276	L1	DUM6	
277-280	I4	ANCMIN	NO. OF MINOR FRAMES, ANCILLARY DATA.
281-284	I4	ANCMAJ	NO OF MAJOR FRAMES, ANCILLARY DATA.
285-292	L1	DUM7	
293-298	I4	IMGMAJ	NO. OF MAJOR FRAMES OF IMAGE DATA.
297-300	I4	PIXMAJ	NO. OF PIXELS FOR A MAJOR FRAME.
301-304	I4	BITPIX	NO OF BITS PER PIXEL.
305-308	I4	SUPBYT	NO. OF SUPPORT BYTES PER SCAN LINE.
309-324	L1	DUM8	
325	L1	DATFOR	IMAGE DATA FORMAT.
326	L1	INTTYP	INTERLEAVING TYPE.
327	L1	INTCNT	LINE INTERLEAVING COUNT.
328	L1	GCA	GEOMETRIC CORRECTIONS APPLIED?
329	L1	GCP	GEOMETRIC CORRECTION DATA PRESENT?
330	L1	RCA	RADIOMETRIC CORRECTIONS APPLIED?
331	L1	RCP	RADIOMETRIC CORRECTIONS PRESENT?
332	L1	RESAM	RESAMPLING APPLIED?
333	L1	MAPPRO	MAP PROJECTION SELECTED.
334	L1	IDJ	IMAGE DATA JUSTIFICATION.
335	L1	MSB	MOST SIGNIFICANT BIT.
336-343	L1	BANDIND	BAND INDICATOR.

Table 22 (continued)

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
344-356	L1	DUM9	
357-360	I4	PIXLIN	NO. OF PIXELS PER SCAN LINE.
361-364	I4	WRSOFF	WRS OFFSET FROM IMAGE CENTER
365-368	I4	NOMOVL	NOMINAL OVERLAP MARK PIXEL OFFSET
369-388	L1	DUM10	
389-392	I4	TRLMIN	NO. OF MINOR FRAMES, TRAILER DATA.
393-396	I4	TRLMAJ	NO OF MAJOR FRAMES, TRAILER DATA.
397-516	L1	DUM11	
517-530	L1	BQUAL	BAND QUALITY CODE.
531-534	L1	DUM12	
535-536	L1	DATSRC	DATA SOURCE.
537-540	L1	TRANSAC	DATA TRANSMISSION ACCURACY.
541-552	L1	DUM13	
553-555	L1	LLS	LINE LENGTH SOURCE.
555-558	I4	TCSPCD	NO. OF TIME CODE SUBST. (PCD PROC.)
559-562	I4	TCSTIPS	NO OF TIME CODE SUBST. (TIPS PASS 1)
563-566	I4	MAJSL	NO. OF MAJOR FRAME SYNC LOSSES.
567-570	I4	MINSL	NO. OF MINOR FRAME SYNC LOSSES.
571-574	I4	MINSE	NO OF MINOR FRAME SYNC ERRORS.
575-578	L1	BITSLIP	NO. OF BIT SLIPS.
579-604	L1	DUM14	
605-612	I4	IMBLLS	NO OF IMBEDDED LINE LENGTH SUBST.
613-620	I4	CALLS	NO. OF COUNTED ACTIVE L. L. SUBST.
621-684	R4	UNPMSC	UNPROCESSED MIR. SCAN CORR. DATA.

Table 22 (continued)

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
685-748	R4	PROMSC	PROCESSED MIR. SCAN CORR. DATA.
749-772	I4	NUMLLS	NO. OF LINE LENGTH SUBSTITUTIONS.
773-868	R4	LINLEN	LINE LENGTH DATA.
869-904	L1	DUM15	
905-911	L1	RADCM	RADIOMETRIC CORRECTION METHOD.
912	L1	DUM16	
913	L1	INTCALM	INTERNAL CALIBRATION LAMP MODE.
914-916	L1	INTCAL	INTERNAL CALIBRATION LAMPS USED.
917-934	L1	DUM17	
935	L1	NCLU	NOMINAL CALIBRATION LAMP USE.
936	L1	DUM18	
937-940	I4	WINSIZ	CALIBRATION WINDOW SIZE.
941-964	L1	DUM19	
965-968	I4	NSCANCAL	NO. OF SCANS IN A CALIB. SEGMENT.
969-972	I4	NSUBCAL	NO. OF SUBSEGS. IN A CALIB. SEGMENT
973-1000	R4	CALACC	RELATIVE CALIBRATION ACCURACY.
1001-1028	R4	GDIFF	RELATIVE GAIN DIFFERENCE.
1029-1204	L1	DUM20	
1205-6004	I2 & R4	DETDATA	DETECTOR DATA. THE 20 PARAMETERS FOR EACH OF THE 100 DETECTORS INCLUDE: MULTIPLICATIVE RADIOMETRIC CORRECTION CONSTANT ADDITIVE RADIOMETRIC CORRECTION CONSTANT NOMINAL CAL VALUE AND NUMBER OF SUBSTITUTIONS OF NOMINAL CAL VALUES (8 VALUES EACH). Ref. 2.
6005-6400	L1	DUM21	

Table 23

HAAT FILE SCENE HEADER RECORD 2

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
1-4	L1	ZFILL2	FILL
5-18	L1	BND-QUAL	OVERALL BAND QUALITIES OF REFERENCE SCENE - 2 BYTES PER BAND IN THE ORDER 1,2,3,4,5,6
19-22	I4	NUM-SC-CP	NUMBER OF SCENES IN CP EXTRACTION INTERVAL
23-26	I4	SEQ-NUM-CP	SEQUENCE NUMBER IN CP EXTRACTION INTERVAL
27-30	I4	NUM-GEOD-PTS-CP	NUMBER OF GEODETIC POINTS USED IN THE CP GENERATION PROCESS, FOR THE INTERVAL
31-34	I4	NUM-GEO-PTS-REF	NUMBER OF GEODETIC POINTS IN REFERENCE SCENE
35-40	L1	DUM50	ZERO FILL
41-44	R4	AVG-CORR-PK-VAL	AVERAGE INITIAL AUTO CORRELATION PEAK VALUE FOR CP'S FROM THE REFERENCE SCENE
45-48	R4	AVG-INIT-PCURV	AVERAGE INITIAL PEAK CURVATURE FOR CP'S FROM THE REFERENCE SCENE
49-68	R4	REF-SCID	REFERENCE SCENE ID (ASCII)
69-84	R4	90P-ER-EL	90% ERROR ELLIPSE - 4 VALUES: ALONG-TRACK, FOR THE INTERVAL ACROSS-TRACK, FOR THE INTERVAL ALONG-TRACK, FOR THE REFERENCE SCENE ACROSS-TRACK, FOR THE REFERENCE SCENE
85-100	L1	DUM51	ZERO FILL
101-104	R4	AVG-PREG-SUCC	AVERAGE PREVIOUS REGISTRATION SUCCESS
105-124	L1	DUM52	ZERO FILL
125-128	I4	NUM-SC-INT	NUMBER OF SCENES IN INTERVAL
129-132	I4	SEQ-NUM-SC	SEQUENCE NUMBER OF THIS SCENE IN INTERVAL

Table 23 (continued)

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
133-136	I4	TOT-CP	TOTAL NUMBER OF CP'S USED IN PERFORMING GEOMETRIC CORRECTIONS, FOR THE INTERVAL
137-140	I4	NUM-CP	NUMBER OF CP'S WHICH WERE FROM THIS SCENE
141-144	L1	DUM53	ZERO FILL
145-148	I4	NUM-CP-PRI	NUMBER OF CP'S WHICH WERE FROM SCENES PRIOR TO THIS IN THE INTERVAL
149-152	I4	NUM-GEOD-CP	NUMBER OF GEODETIC CP'S USED IN GEOMETRIC CORRECTIONS, FOR THE INTERVAL
153-156	I4	CP-CORR-ATT-INT	TOTAL NUMBER CP CORRELATIONS ATTEMPTED FOR THE INTERVAL
157-160	I4	NUM-CP-REJ-INT	NUMBER CP'S REJECTED DURING CORRELATION PROCESS
161-164	I4	NUM-CCP-REJ-MOD	NUMBER OF CORRELATED CP'S IN THE INTERVAL REJECTED DURING MODELING PROCESS
165-168	I4	NUM-CP-CORR-ATT-SC	TOTAL NUMBER OF CP CORRELATIONS ATTEMPTED FOR THIS SCENE
169-172	I4	NUM-CP-REJ-SC	TOTAL NUMBER OF CP'S IN THIS SCENE REJECTED DURING CORRELATIONS PROCESS
173-176	I4	NUM-CCP-SC-REJ	NUMBER OF CORRELATED CP'S IN THIS SCENE REJECTED DURING MODELING PROCESS
177-180	I4	NUM-CP-REJ-CC	NUMBER OF CP'S IN THIS SCENE REJECTED FOR CLOUD COVER
181-184	I4	NUM-CP-REJ-SN	NUMBER OF CP'S IN THIS SCENE REJECTED FOR SNOW COVER
185-188	I4	NUM-CP-GT50-CC	NUMBER OF CP'S FROM THIS SCENE CONTAINING GREATER THAN 50% CLOUD COVER

Table 23 (continued)

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
189-204	L1	DUM54	ZERO FILL
205-684	R4	CPID-LOC	CP ID AND CP LOCATION ((6,20) ARRAY: REF. 2)
685-688	R4	CP-CORR-PK-VAL	AVERAGE CP CORRELATION PEAK VALUE FOR THIS SCENE
689-692	R4	CP-CORR-PK-CURV	AVERAGE CP CORRELATION PEAK CURVATURE FOR THIS SCENE
693-704	L1	DUM55	ZERO FILL
705-706	L1	GEOM-QUAL	OVERALL GEOMETRIC QUALITY CODE
707-722	R4	RMS-GEOM-MOD-ER	RMS GEOMETRIC MODELING ERRORS - 4 VALUES: ALONG-TRACK, FOR THE INTERVAL ACROSS-TRACK, FOR THE INTERVAL ALONG-TRACK, FOR THE SCENE ACROSS-TRACK, FOR THE SCENE
723-734	R4	EPH-OFF	EPHEMERIS OFFSETS - 3 VALUES (X,Y,Z) IN KM
735-750	R4	EST-DIST	ESTIMATED DISTORTIONS - 4 VALUES IN METERS ALONG-TRACK, SKEW ALONG-TRACK, STRETCH ACROSS-TRACK, SKEW ACROSS-TRACK, STRETCH
751-770	L1	DUM56	ZERO FILL
771-850	R4	GEOM-MOD-RES	GEOMETRIC MODELING RESULTS - FILTER BIASES FOR THE SCENE
851-930	R4	STVEC-SC	STATE VECTOR AT SCENE CENTER
931-2530	R4	ERR-COV-MAT	STATE ERROR COVARIANCE MATRIX AT SCENE CENTER; ((20,20) ARRAY; REF. 2)
2531-4130	R4	DYN-NOI-MAT	DYNAMIC NOISE MATRIX AT SCENE CENTER; ((20,20) ARRAY; REF. 2)
4131-4504	L1	DUM57	ZERO FILL

Table 23 (continued)

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
4505-4888	R4	GCD-QUAL	GCD QUALITY VALUES ((4,2,2,6) ARRAY; REF. 2) AS FOLLOWS: MEAN PO-SOM VARIANCE ACROSS FORWARD YO-SOM MAXIMUM DOWN REVERSE ALONG SCAN HF MINIMUM ACROSS SCAN HF PO-UTM/PS
4889-4920	R4	GCD-MM-HF	MAXIMUM AND MINIMUM VALUES IN THE HIGH FREQ. ((2,2,2) ARRAY; REF. 2) MATRIX FOR BOTH FORWARD AND REVERSE SCANS: MAXIMUM FORWARD ALONG SCAN HF MINIMUM REVERSE ACROSS SCAN HF
4921-4928	R4	NORM-CHNG-MSCAN MS	NORMALIZED CHANGE FROM NOMINAL OF THE MIDSCAN POSITION FOR BOTH FORWARD AND REVERSE SCANS FORWARD REVERSE
4929-4988	R4	GCD-STAT	GCD STATISTICS ((3,5) ARRAY; REF. 2) AS FOLLOWS: SCAN GAP SIZE MAXIMUM SCAN GAP SKEW MINIMUM INPUT PIXEL DISTANCE MEAN . MAXIMUM , MINIMUM
4989-6400	L1	DUM58	ZERO FILL

Table 24

TM HAAT ANCILLARY MAJOR FRAME 1

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
1-4	L1	ZFILL	FILL
5-8	I4	PIX_ILINE	NOMINAL NUMBER PIXELS PER INPUT LINE
9-12	I4	NILIN_PPIM	NUMBER INPUT LINES IN PARTIALLY PROCESSED IMAGE
13-16	R4	IPDIS	NOMINAL SCALE OF INPUT INTER-PIXEL DISTANCE IN METERS PER PIXEL
17-20	R4	ILDIS	NOMINAL SCALE OF INPUT INTER-LINE DISTANCE IN METERS PER PIXEL
21-24	I4	PIX_OLINE	NUMBER PIXELS/OUTPUT LINE OF FULLY PROCESSED IMAGE
25-28	I4	NLIN_OIMG	NUMBER OF LINES PER OUTPUT IMAGE OF FULLY PROCESSED IMAGE
29-32	R4	SCL_OIPDIS	SCALE OF FULLY PROCESSED OUTPUT INTER-PIXEL DISTANCE IN METERS PER PIXEL
33-36	R4	SCL_OILDIS	SCALE OF FULLY PROCESSED OUTPUT INTER-LINE DISTANCE IN METERS PER PIXEL
37-40	R4	NALT	NOMINAL SPACECRAFT ALTITUDE IN METERS
41-44	R4	NISWA	NOMINAL INPUT SWATH WIDTH IN METERS
45-92	R4	MMCOEF	TM MIRROR MODEL COEFFICIENTS FOR FOWARD AND REVERSE SCAN (6 COEFFICIENTS EACH)
93-96	R4	MM_ANG	TM MAXIMUM MIRROR ANGLE IN RADIANS
97-100	R4	SCSK	SCAN SKEW CONSTANT (AS A RESULT OF FINITE SCAN TIME)
101-104	R4	NTIM_BMSWP	NOMINAL TIME BETWEEN SUCCESSIVE TM MIRROR SWEEPS IN SECONDS
105-108	R4	NTIM_AMSWP	NOMINAL TIME FOR THE ACTIVE PORTION OF A TM MIRROR SWEEP IN SECONDS

Table 24 (continued)

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
109-112	R4	SMA_AXIS	SEMI-MAJOR AXIS OF EARTH ELLIPSOID IN METERS
113-116	R4	SMI_AXIS	SEMI-MINOR AXIS OF EARTH ELLIPSOID IN METERS
117-120	R4	E_CURV	EARTH CURVATURE CONSTANT (DEPENDENT ON SPACECRAFT'S NOMINAL ALTITUDE AND EARTH RADIUS)
121-260	L1	DUM1	ZERO FILL
261-264	I4	WRS_PATH	WRS PATH
265-268	I4	WRS_ROW	WRS ROW
269-284	L1	FSC_STIM	FIRST SCAN SPACECRAFT TIME
285-300	L1	LSC_STIM	LAST SCAN SPACECRAFT TIME
301-316	L1	PCD_SSTIM	PCD START SPACECRAFT TIME
317-324	R8	_SCSTIM	SCENE CENTER SPACECRAFT TIME RELATIVE TO PCD TELEMETRY START
325-328	I4	SACSWP	SCENE CENTER SWEEP
329-332	I4	SC_GCD	NUMBER OF SCANS FOR WHICH GCD DATA IS COMPUTED
333-336	R4	ERAD_WRSSC	EARTH RADIUS AT WRS SCENE CENTER IN METERS
337-340	R4	ORAD_WRSSC	SPACECRAFT ORBIT RADIUS AT WRS SCENE CENTER IN METERS
341-344	R4	LAT_WRSC	WRS CENTER LATITUDE IN RADIANS
345-348	R4	LON_WRSC	WRS CENTER LONGITUDE IN RADIANS
349-352	R4	EROTP	EARTH ROTATION PARAMETER (IMAGE SKEW) IN RADIANS
353-516	L1	DUM2	ZERO FILL
517-520	L1	SOM	MAP PROJECTION ID - "SOM"
521-524	R4	X_WRSSC	WRS SCENE CENTER X COORDINATE
525-528	R4	Y_WRSSC	WRS SCENE CENTER Y COORDINATE

Table 24 (continued)

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
529-532	R4	DRANG	DISPLAY ROTATION ANGLE IN RADIANS
533-536	I4	HOR_DS	HORIZONTAL DISPLAY SHIFT IN PIXELS
537-540	R4	LAT_OPSC	OUTPUT PRODUCT SCENE CENTER LATITUDE IN RADIANS
541-544	R4	LON_OPSC	OUTPUT PRODUCT SCENE CENTER LONGITUDE IN RADIANS
545-556	R4	OPSC	OUTPUT PRODUCT SCENE CENTER IN EARTH-CENTERED EARTH-FIXED COORDINATES IN METERS
557-560	R4	SH_ANG	SPACECRAFT HEADING ANGLE AT OUTPUT PRODUCT CENTER IN RADIANS
561-564	I4	SLN	SCAN LINE NUMBER OF OUTPUT PRODUCT SCENE CENTER IN PARTIALLY PROCESSED IMAGE
565-568	I4	PIXN_OPSC	PIXEL NUMBER OF OUTPUT PRODUCT SCENE CENTER IN PARTIALLY PROCESSED IMAGE
569-572	R4	NS_VELE	NORMALIZED SPACECRAFT VELOCITY ERROR FROM NOMINAL AT OUTPUT PRODUCT SCENE CENTER IN M/SEC.
573-576	R4	ERO_VEL	EARTH ROTATION VELICITY AT OUTPUT PRODUCT CENTER IN METERS PER SECOND
577-596	L1	DUM3	ZERO FILL
597-600	L1	MAPID2	MAP PROJECTION ID - "UTM" OR "PS"
601-604	R4	X_WRSSC2	WRS SCENE CENTER X COORDINATE
605-608	R4	Y_WRSSC2	WRS SCENE CENTER Y COORDINATE
609-612	R4	DRANG2	DISPLAY ROTATION ANGLE IN RADIANS
613-616	I4	HOR_DS2	HORIZONTAL DISPLAY SHIFT IN PIXELS FOR SECOND MAP PROJECTION
617-620	R4	LAT_OPSC2	OUTPUT PRODUCT SCENE CENTER LATITUDE IN RADIANS
621-624	R4	LON_OPSC2	OUTPUT PRODUCT SCENE CENTER LONGITUDE IN RADIANS

Table 24 (continued)

BYTES	VAX FORMAT	SHORT NAME	DESCRIPTION
625-636	R4	OPSC2	OUTPUT PRODUCT SCENE CENTER IN EARTH-CENTERED EARTH-FIXED COORDINATES IN METERS
637-640	RF4	SH_ANG2	SPACECRAFT HEADING ANGLE AT OUTPUT PRODUCT CENTER IN RADIANS
641-644	I4	SLN2	SCAN LINE NUMBER OF OUTPUT PRODUCT SCENE IN PARTIALLY PROCESSED IMAGE FOR SECOND MAP PROJ.
645-648	I4	PIXN_OPSC2	PIXEL NUMBER OF OUTPUT PRODUCT SCENE CENTER
649-652	R4	NS_VELE2	NORMALIZED SPACECRAFT VELOCITY ERROR FROM NOMINAL AT OUTPUT PRODUCT SCENE CENTER IN M/SEC.
653-656	R4	ERO_VEL2	EARTH ROTATION VELOCITY AT OUTPUT PRODUCT CENTER IN METERS PER SECOND
657-6400	L1	DUM4	ZERO FILL

Table 25

TM HAAT ANCILLARY MAJOR FRAME 2

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
1-4	L1	ZFILL2	FILL
5-8	L1	SOMID2	ASCII "SOM"
9-1032	R4	SOMBENCH	BENCHMARK MATRICES ((4,8,4,2) ARRAY; REF.2)
1033-1036	L1	P2ID	MAP PROJECTION ID "UTM" OR "PS"
1037-2060	R4	P2BENCH	BENCHMARK MATRICES FOR SECOND MAP PROJECTION ((4,8,4,2) ARRAY; REF. 2)
2061-3556	I4	LL	NUMBER OF COMPLETE MINOR FRAMES DETERMINED BY IMBEDDED LINE LENGTH INFORMATION
3557-3560	R4	FSR	NOMINAL POINTING VECTOR FORWARD SCAN RATE
3561-3564	R4	RSR	NOMINAL POINTING VECTOR REVERSE SCAN RATE
3565-3592	R4	BNDLDC	NOMINAL ALONG SCAN FOCAL PLANE BAND LOCATIONS
3593-4488	R4	DETLOC	NOMINAL ALONG SCAN FOCAL PLANE DETECTOR ((16,2,7) ARRAY; REF.2) LOCATION DATA
4489-4516	R4	CSDACL	CROSS SCAN DETECTOR ARRAY CENTER LOCATIONS
4517-4544	R4	CSFPDS	CROSS SCAN FOCAL PLANE DETECTOR SPACING DATA
4545-4600	I4	ND	DFP ODD DETECTOR ((7,2) ARRAY; REF.2)
4601-6400	L1	SPARE2	ZERO FILL

Table 26

TM HAAT ANCILLARY MAJOR FRAME 3

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
1-4	L1	ZFILL3	FILL
5-2996	R8	TAN	MIRROR SCAN START TIMES RELATIVE TO PCD TELEMETRY START IN SECONDS
2997-6400	L1	SPARE3	ZERO FILL

Table 27

TM HAAT ANCILLARY MAJOR FRAMES 4-12, 13-21

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
1-4	I.1	ZFILLA	FILL
5-5884	R4	THETA	HIGH FREQUENCY ALONG SCAN MATRIX PCD TELEMETRY START IN SECONDS ((35,42) ARRAY: REF.2)
5885-6400	L1	SPARE	ZERO FILL

Table 28

HAAT FILE ANNOTATION RECORD 1

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
1-4	L1	ZFILL1	FILL
5-12	A8	DATE-OF-ACQUISITION	DATE OF IMAGE ACQUISITION (DDMMYYY)
13-29	A17	FC-LAT-LON	IMAGE FORMAT CENTER LAT/LON
30	A1	NODE-INDICATOR	NODE INDICATOR (ASCENDING/DESCENDING)
31-38	A8	WRS-PATH-ROW	WRS PATH/ROW INDICATOR
39-55	A17	WRS-SC-LAT-LON	WRS SCENE CENTER LAT/LON
56-65	A10	BAND-IDS	BAND ID'S
66-79	A14	SUN-ANGLES	SUN ELEVATION AND AXIMUTHAL ANGLES
80-91	A12	PROCESSING-CODES	PROCESSING CODES
92-104	A13	AGENCY-PROJECT	AGENCY AND PROJECT IDENTIFIER
105-119	A15	SCENE-ID	SCENE IDENTIFICATION
120-132	A13	ADDS-ID	ADDS IDENTIFICATION (ENGR OR TEST)
133-420	L1	TICKS	UTM/PS TICK MARKS ((9,32)
421-6400	L1	FILL	FILL TO 6400 BYTES

NOTE: UT/PS ANNOTATION RECORD

Table 29

SOM ANNOTATION RECORD. (Format is the same as Table 28.)

Table 30

HAAT FILE INTERVAL TRAILER RECORD

BYTES	VAX FORMAT	PARAMETER NAME	DESCRIPTION
1-4	L1	ZFILL	FILL
5-8	I4	N	SCAN COUNT
9-24	I4	NQ	QUALITY INDICATOR SUMMARY COUNT
25-2024	I2	LQM	LINE QUALITY MAPS
2025-3624	I2	RRD	NO. OF R-TAPE READ ERRORS ((2,200,2) ARRAY: REF. 2)
3625-4424	I2	AWRT	NO. OF A-TAPE WRITE ERRORS ((2,200) ARRAY; REF.2)
4425-6400	L1	DUM	